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Fact Sheet

Heating With Wood

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United States
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Wood Heat: Is It Right For You?

Assuming that it is more than nostalgia or a need for physical exercise that is encouraging you to think about wood as a fuel for your home—assuming that you want to save some money—there are a few things that you must consider. Otherwise, any anticipated savings could dissipate like smoke in a wind.

Wood's Advantages

Using wood for fuel has advantages for the Nation, the forest, and the homeowner. Wood fuels can help lessen our Nation's need for imported oil. Millions of tons of low-quality wood go unused every year. Removing this surplus wood from the forests can help reduce fire danger; using the wood for fuel helps make this form of fire prevention more economical. Improving the quality of our Nation's forests, through removal of stunted, deformed, or undesirable species of trees as well as logging leavings and other residue, is more economical if those trees and residues are used for fuel.

Although the potential benefits from fuelwood harvesting are widespread, the big advantage seen by those who use wood for energy is that the cost of fuelwood has not risen as rapidly as the cost of most other fuels. That is the focus of this fact sheet. If wood fuel is used properly, it is possible to save hundreds of dollars during a heating season. However, if it is used unwisely, or if the homeowner fails to consider some of the hidden expenses, trying to use wood for fuel can result in heating costs higher than those for even the most expensive oil. Here are some things to consider:

Obtaining Wood

You can purchase wood you want to use for fuel, or you can cut your own. Either way, there are expenses and other factors to consider. For instance, you should consider how much wood you need, what kind of wood you want, how much it should cost, whether it is cheaper to cut it yourself or to buy it, what you are going to burn it in, and what you need to know to burn wood.

One of the first things to think about is how much wood you need and how much you can afford

to spend getting it before it costs more than other fuels. Begin by figuring the amount of fuel you use during an average heating season. Then use the fuel conversion table to figure the amount of air-dried wood needed for an equivalent amount of heat.

Pound for pound, all species of wood produce about the same amount of heat when burned. However, the weight for a given volume of wood varies considerably among species. If you are purchasing wood by a volume measure, such as the cord, you need to do some more converting. Look at the table which gives the ratings for firewood. The first column shows the relative amount of heat by wood species. Those with a high rating weigh about 3,500 to 4,000 pounds per cord, if the wood has been allowed to dry to about 20 percent moisture content. Those in the medium range weigh about 3,000 pounds per cord, and those in the low range weigh about 2,000 to 2,500 pounds per cord. If you used 1,000 gallons of fuel oil last year and you want to burn oak this year, you will need 22,200 pounds or about 5-1/2 to 6-1/3 cords of air-dried oak (see the fuel conversion table). If you want to burn aspen, you will still need 22,200 pounds of wood, but the volume measure will be close to 11 cords.

Calculate how much the fuel you are now using will cost for the next heating season. Using that as your maximum allowable expenditure, subtract from it the costs of the wood and the costs of burning the wood. Be sure to include the cost of the wood itself as well as costs associated with cutting it yourself, the cost of the stove or other burning apparatus, and storage costs.

If you buy your wood already cut, here are two words of caution. First, if you purchase wood by weight, be sure the wood is air dried. About half the weight of "green" wood, fresh-cut from living trees, can be water. Ask the seller how long the wood was air dried and whether it was cut to length and split before drying. If the answers are "at least nine months" and "yes" respectively, you can assume you'll get fair heat value for the weight. Or take two pieces of the wood, each about 2 inches square and 16 inches long, and bang them together. If you get a dull "clunk" the wood is probably still "green." If you get a sharper sound, with almost a ring to it, the wood is probably dry.

Second, if you purchase wood by volume, be sure you and the seller are talking about the same amount. There are many different types of cords; they have names such as standard, face, short, long,

RATINGS FOR FIREWOOD

	Relative amount of heat	Easy to ignite	Easy to split	Does it have heavy smoke	Does it pop or throw sparks?	General rating and remarks
HARDWOOD TREES						
Apple, ash, beech, birch, dogwood, hard maple, hickory, locust, mesquite, oaks, Pacific madrone, pecan.	High	No	Medium ...	Little	Yes, when poked	Excellent.
Alder, cherry, soft maple, walnut	Medium	Medium	Yes	Little	Little	Good.
Elm, gum, sycamore	Medium	Medium	No	Medium	Little	Fair—contains too much water when green.
Aspen, basswood, cottonwood, yellow-poplar	Low	Yes	Yes	Medium	Little	Fair—but good for kindling
SOFTWOOD TREES						
Douglas-fir, southern yellow pine	Medium	Yes	Yes	Yes	Little	Good but smoky.
Cypress, redwood	Low	Yes	Yes	Medium	Little	Fair.
Eastern redcedar, western redcedar, white cedar	Low	Yes	Yes	Medium	Yes	Fair—excellent for kindling.
Eastern white pine, ponderosa pine, sugar pine, western white pine, true firs	Low	Yes	Yes	Medium	Little	Fair—good kindling.
Larch, tamarack	Medium	Yes	Yes	Yes	Yes	Fair
Spruce	Low	Yes	Yes	Medium	Yes	Fair—but good for kindling when dry

FUEL CONVERSION TABLE

FUEL	WOOD EQUIVALENT
1 gallon of No. 2 fuel oil	22.2 pounds
1 therm (100 cubic feet) of natural gas	14.0 pounds
1 gallon of propane gas	14.6 pounds
1 kilowatt-hour of electricity	.6 pounds
1 pound of coal	1.6 pounds

solid, and maybe other local variations such as the “pickup load.” The standard cord, which is used for measures and comparisons in this fact sheet, is a tightly stacked pile of wood with all the pieces lying in the same direction, measuring 4 feet high, 8 feet wide, and 4 feet long, or any other measures which multiply out to 128 cubic feet. Other cords, such as the short cord and face cord, usually measure 4 feet high, 8 feet wide, but may contain pieces of any length so their actual volume could be as little as one-third of a standard cord.

Although you can save money by cutting your own wood, you still must consider some expenses. For instance, the gasoline to travel to the place of purchase, the rent or purchase price for a truck or trailer, saws, axes, safety equipment, and the liniment for your aching muscles all cost money. There also may be a charge for the wood.

Another expense is storage, whether you buy wood or cut it yourself. It is a good idea to store the wood under some sort of shelter so that it stays dry. The cost of the shed or tarpaulin should be amortized over their lifetimes and the yearly cost figured in the heating bill. Care must also be exercised in

wood storage to prevent damage to the shed or to your house that could be caused by insects that may be in the wood, or by rodents that may be attracted to the wood piles as places for their nests.

Getting The Most From Your Fire

Burning dry wood is generally more enjoyable than using wet wood. Wet wood is harder to start burning, takes longer to heat up, and produces less heat per pound handled. Wet wood also produces a longer lasting fire.

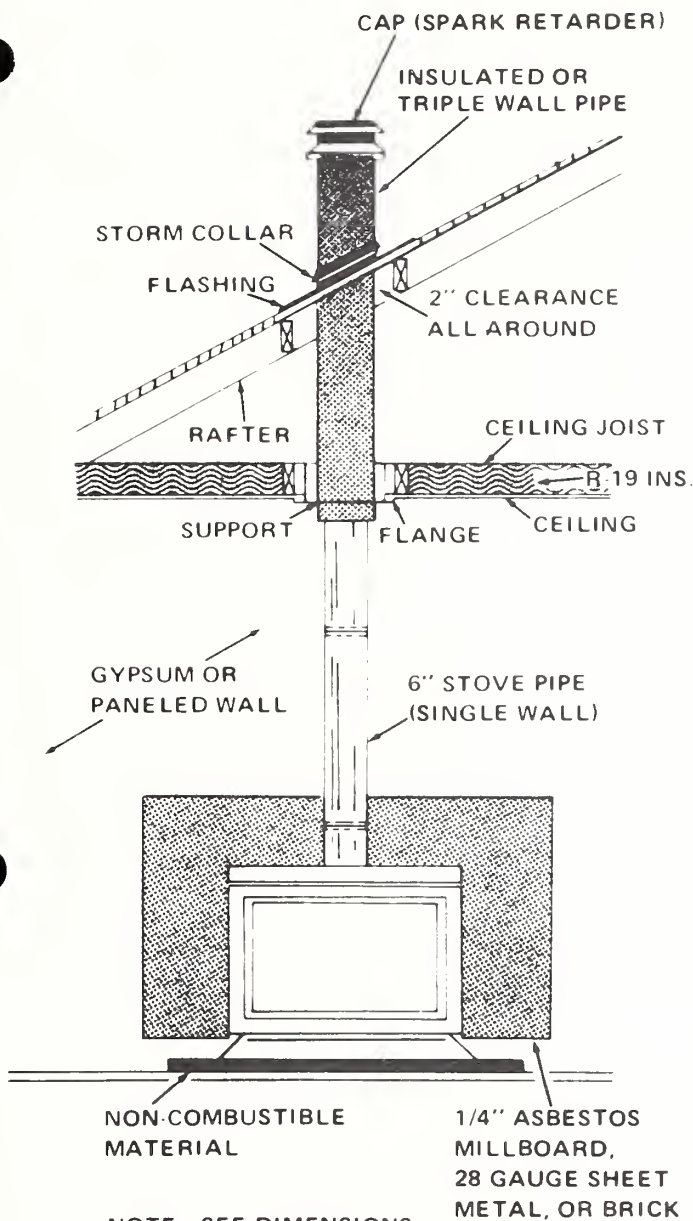
It takes a long time to dry wood, usually 9 months or more. The best way to insure that you have dry wood is to cut it the winter before the heating season you plan to use it. Cut the wood into lengths to fit your burner, and split all pieces more than 8 inches in diameter. Pile the wood in loose stacks off the ground on bricks or poles so air can circulate through it and cover it to protect it from rain and snow. If you don't have 9 months to dry the wood, look for dead trees, preferably the ones that have lost their bark.

One of your most significant expenses may be the apparatus in which you burn your wood. Careful selection and wise investment are important because the wood burner will greatly influence how much heat value you get for each dollar spent.

For instance, fireplaces are very inefficient. As much as 90 percent of the heat value in the wood can be lost up the chimney. Also, fireplaces draw air for combustion from the room, thereby sending up the chimney those dollars you spent heating that air

Thru-Roof Installation

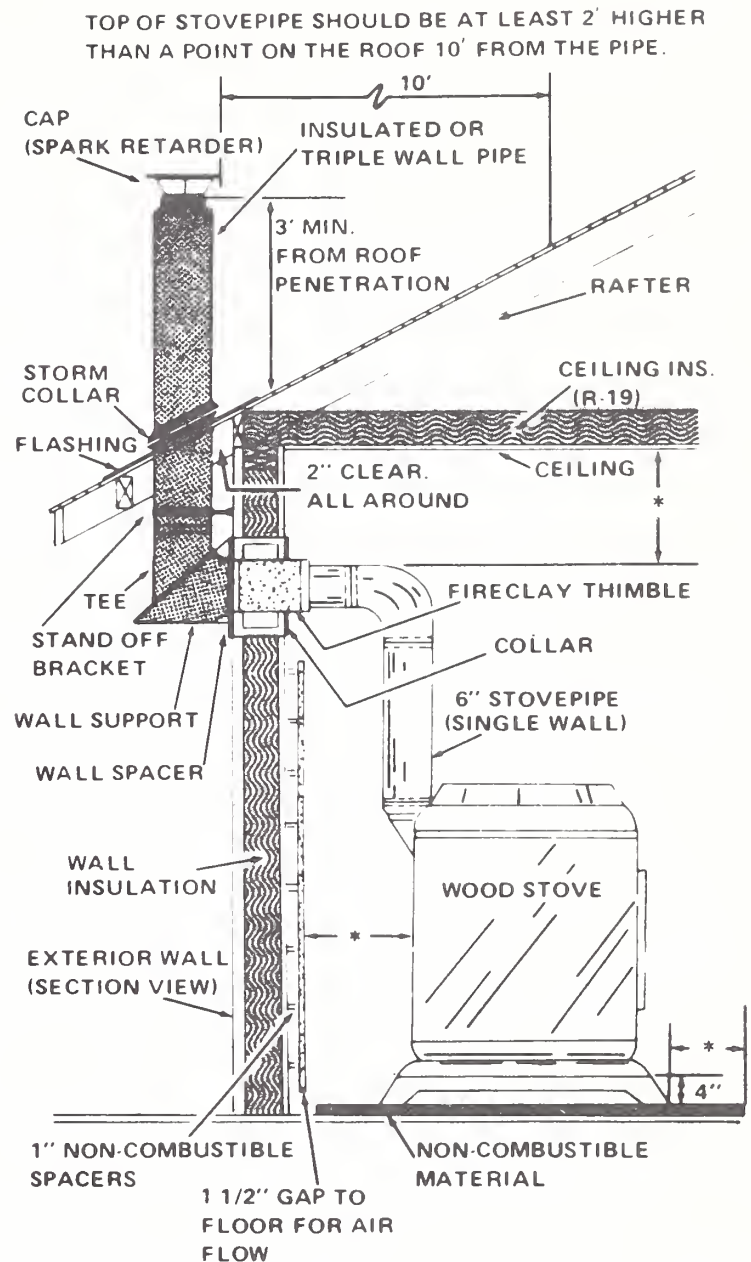
FRONT VIEW



NOTE: SEE DIMENSIONS FOR CHIMNEY & HEATER CLEARANCE REQUIREMENTS & MATERIALS

Thru-Wall Installation

SIDE VIEW



*Check your local building code for the distances shown here. If the code contains no specific instructions, 18 inches is a minimum safe distance to use.

with gas or oil. Fireplaces with heat exchangers can be more efficient, but they still do not solve the problem with the combustion air. Glass doors help control the amount of air pulled from the room, but they reduce the heat radiated into the room by the burning wood.

Airtight stoves or furnaces are the most efficient way to extract heat from wood. Modern wood-burning stoves approach the efficiency of modern gas or oil furnaces, with more than half of the heat energy in the fuel being converted into usable heat in the room or dwelling. This is because the

operator can control the rate of combustion and thereby make the wood last longer while providing an even flow of heat to the room.

However, purchasing an airtight stove larger than is needed or overloading one with wood can also cause problems. For instance, if the stove puts out too much heat and you cut back on the air too severely, volatile components of the wood will be driven off but will not be burned due to lack of oxygen. These will then condense in the chimney as a foul-smelling, oily soot known as creosote. If allowed to build up, the creosote can catch fire,

usually when there is a hot fire in the stove.

Airtight stoves can be expensive and their cost must be considered in the overall heating expense. But trying to heat without such a stove, that is, trying to use an existing fireplace, could be even more costly in terms of energy dollars wasted up the chimney.

Safety

One thing you must not overlook in cutting and burning wood is safety. There's no such thing as a little mistake when you are cutting wood. Whether you use a chain saw or a cross-cut saw, it is easy to give yourself a nasty cut. Slashes from the ax, smashed fingers, and splinters are some occupational hazards for the woodchopper. Goggles, sawyer's chaps, steel-toed shoes, and gloves should be used to protect yourself from wounds. Although these protective devices cost money, a trip to the doctor can cost more. It is never a good idea to work alone; an injury can become fatal if there is no one to send for help.

It is also vital to consider safety in the installation and use of wood-burning stoves. The U.S. Consumer Product Safety Commission reports that emergency treated burn injuries arising from the use of wood-burning stoves and free-standing fireplaces have increased almost 800 percent in the past 5 years. This coincides with the growth in use of wood for fuel since the oil embargo of 1974-75. Numerous deaths have been attributed to use of wood- or coal-burning stoves.

The Consumer Product Safety Commission has determined that improper installation of the chimney and chimney connectors that pass through walls or other parts of the structure is a major cause of the fires attributed to heating systems. Other important causes of house fires are excessive creosote buildup due to improper maintenance of the stove, chimney, and connectors; and imprudent operation of the stove, such as starting fires with flammable liquids or overfiring with too much fuel or air.

The drawing in this fact sheet shows proper installation of a wood-burning stove. Special attention must be given to the installation of the chimney and chimney connectors. They should be kept as short and with as few bends as possible. Long, horizontal runs of chimney pipe should be avoided completely. Pipe joints should be tight enough so that you cannot see light through them. There should be no cracks or holes in the pipe or chimney. Pipe should be assembled so that upper sections fit into the lower sections. That way, creosote can drip back into the firebox where it will be burned instead of running down the outside of the pipe where it can drip onto the floor.

The chimney and connectors should be examined regularly, not only to see if they need cleaning because of creosote buildup but also to

check for damage, loose bricks or fittings, or the construction of animal nests.

It is a good idea to check local building codes because many of them contain special provisions for fire safety related to wood stoves. Installation of wood burning stoves can also affect your home insurance rates. This additional expense should be factored into the heating costs.

Finally, disposal of ashes can involve some expense, especially when safety considerations are taken into account. Ashes are useful as fertilizer and some can be spread on a garden, with the remainder being returned to the woodlot. However, they should be stored and transported in a fireproof container. Hot ash can ignite wood or paper boxes. A metal garbage can, in an area where it does not touch anything flammable, will provide good storage for ashes.

Conclusion

With one eye on economics and one on safety, using wood for energy can be both pleasurable and profitable. However, the fact that wood is the oldest fuel doesn't mean it's the easiest one to use. There are both costs and hazards. Knowing the properties of different species of wood, how to prepare them for burning, how to build safe fires, and how to control air flow to those fires are some of the first things to consider before embarking on a wood-for-energy project.

For More Information

For further information on the many aspects of using wood for home fuel, check with your county extension agent or city forester; they have more detailed information about wood energy. You may also consider sending for one of the following publications to answer your questions on everything from felling trees to ash disposal:

Wood heat—A 20-page tabloid produced by the Cooperative Extension Service of Mississippi State University is available free (at this writing) from Extension Forestry, MSU, P.O. Box 5426, Mississippi State, MS 39762.

Wood for home heating—A series of eleven 2- or 4-page brochures produced by the University of Wisconsin-Extension is available for \$1.75 (includes postage and handling; Wisconsin residents add sales tax) from Cooperative Extension Programs, UW-Extension, 432 N. Lake Street, Madison, WI 53706. If you want individual brochures from the series write for a list of titles and prices.

Woodburning reprints—A series of four reprints on various aspects of wood preparation, burning, and safety printed by the Country Journal magazine. These are available for \$4.00 (Vermont residents add sales tax; all purchasers add \$1.00 for postage and handling) from Country Journal, 205 Main Street, Brattleboro, VT 05301. If you want individual reprints, write for a list of titles and prices.